EFFECTIVENESS OF STATIC BICYCLE ON IMPROVING PAEDIATRIC ENDURANCE IN SPASTIC DIPLEGIC CEREBRAL PALSY CHILDREN

Dissertation work submitted to

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY,

Chennai-32

towards partial fulfillment of the requirements of

MASTER OF PHYSIOTHERAPY

Degree programme

Submitted by

Reg no:27102321

P.P.G. COLLEGE OF PHYSIOTHERAPY

9/1, keeranatham road,

Saravanampatti,

Coimbatore-641035

www.ppgphysiotherapy.ac.in

THE DISSERTATION ENTITLED

"EFFECTIVENESS OF STATIC BICYCLE ON IMPROVING PAEDIATRIC ENDURANCE IN SPASTIC DIPLEGIC CEREBRAL PALSY CHILDREN"

Submitted by

Reg no:27102321

Under the guidance of

Prof. MR MURUGESAN. M.P.T (NEURO).

Dissertation submitted to

THE TAMILNADU DR. M. G. R. MEDICAL UNIVERSITY,

CHENNAI-32.

Dissertation evaluated on ----------

Internal Examiner **External Examiner**

CERTIFICATE I

This is to certify that the dissertation entitled **"EFFECTIVENESS OF STATIC BICYCLE ON IMPROVING PAEDIATRIC ENDURANCE IN SPASTIC DIPLEGIC CEREBRAL PALSY CHILDREN "** was carried out by Reg.No.27102321 P.P.G College of physiotherapy, Coimbatore-35, affiliated to the Tamilnadu Dr. M.G.R medical university, Chennai-32, under the guidance of Prof. Mr. MURUGESAN. M.P.T (NEURO).

Prof. K. RAJA SENTHIL M.P.T (Cardio-Resp).,MIAP.,Ph.d

Principal

CERTIFICATE II

This is to certify that the dissertation entitled **"EFFECTIVENESS OF STATIC**

BICYCLE ON IMPROVING PAEDIATRIC ENDURANCE IN SPASTIC DIPLEGIC CEREBRAL PALSY CHILDREN " was carried out by Reg. No. 27102321 P.P.G College of physiotherapy, Coimbatore-35, affiliated to the Tamilnadu Dr. M.G.R medical university, Chennai-32, under my guidance and direct supervision.

Prof. Mr. MURUGESAN. M.P.T (NEURO).., MIAP

Professor

ACKNOWLEDGEMENT

I give my thanks to **GOD ALMIGHTY** for providing me the wisdom and knowledge to complete my study successfully.

It is my bounded duty to express at the outset heartiest gratitude to my parents and family for their strong support and encouragement that enabled me to turn this idea into a reality. I am very grateful to her throughout my life.

I express my sincere gratefulness to **Dr.L.P.THANGA VELU, M.S., F.R.C.S., Chairman** and Mrs. SHANTHI THANGAVELU, M.A., correspondent, P.P.G group of institutions, Coimbatore, for their encouragement and providing the source for the successful of the study.

I express my sincere thanks to my principal **Prof. K.RAJA SENTHIL M.P.T(Cardio-Resp).,MIAP., Principal** of P.P.G.College of physiotherapy who extend his guidance and encouragement throughout this project.

I express my special thanks to my Guide Prof. **MURUGESAN. M.P.T (NEURO).,MIAP.,** Assistant for offering me perceptive inputs and guiding me entirely through the course of my work and without his tiredless guidance, support, and constant encouragement this project would not have come through.

I express my heartful thanks to class co ordinator **ASST Prof.. K.RAJESH KANNAN M.P.T (ORTHO).,MIAP**

My heartful thanks to **PHYSIOTHERAPY FACULTY** members for their guidance and encouragement for my studies.

I express my thanks to each and every **PATIENT** who co-operated to fulfill this dissertation work possible.

Last but not least I thank my **FRIENDS AND FAMILY MEMBERS** who provided support and encouragement throughout this work.

CONTENTS

ABSTRACT

Subject objective : It is an experimental study design to determine the effectiveness of static bicycle on improving pediatric endurance n spastic diplegic cerebral palsy children.

DESIGN: The study was Pre-test and post-test experimental group design.

Participants: A sample of 40 spastic diplegic cerebral palsy children were divided in to 2 groups :

Group A :Experimental group :Treated with static bicycle

Group B : Control group treated with traditional stretching and mat activities.

Outcome measures : Pediatric endurance was measured using 600-yard walk run test and 30 sec walk test

Results : Statistically group A was significant when compared to group B which received stationary bicycle.

Conclusion : The study concludes that stationary bicycling in beneficial in improving paediatric endurance in patients with spastic diplegic cerebral palsy.Thus, this study accepts the alternate hypothesis.

LIST OF TABLES

LIST OF GRAPHS

CHAPTER I

1.1 INTRODUCTION

Spastic diplegia,historically known as litter's disease is a form of cerebral palsy CP that is a neuromuscular condition of hypertonia and spasticity in the muscle of lower extremities of childrens.

Leading cause of developmental disability in children,occurring in 1 to 500 live births and affecting more than 5,00,000 individuals in the united states.The prevalence of spastic diplegia increases with gestational age and low birth weight.

Periventricular leucomalacia is the common MRI finding in these children and represent the neuropathological substrate for spastic CP.This condition is by far the most common type of CP occurring in almost 70 n% of all cases.

one major problem affecting the function and health of childrens with cerebral palsy is weakness and resultant lack of physical activity.Historically exercise to promote physical fitness and strengthening discouraged for childrens with spasticity,due to the concern that spasticity and abnormal movements patterns would be enhanced .(VAUGHEL,ABEL in 1995) ,states that current research ,however ,indicates that resistive exercise does in fact improve strength and function for children with cerebral palsy .

Spastic diplegia 's particular type of brain damage inhibits the proper development of upper motor neuron function,impacting the motor cortex,the basal ganglia and the corticospinal tract.This abnormally high muscle tone that results creates life long difficulty with all voluntary and passive movement in the legs and in general creates stress over time.Constant spasticity ultimately produces pain,muscle/joint break down.

Rifton equipment manufactures 3 sizes of an adaptive tricycle,designed so that they do not require significant balance or skilled motor ability on the part of the user.Cycling has the potential to improve endurance,gross motor fuction and health related quality of life.(DODD KJ,TAYLOR,DOMINO DL 2002

Research studies focussing on the use of static bicycling as an exercise activity for childrens with CP have resulted is supportive evidence for this intervention, for both muscle activation and function.

In this study, patients with contractures and other malalignment are not included. Severe arthritis, tenditis and similar break down can start as early as the spastic diplegic person's mid-20 s.Fowler said "one reason we chose cycling is that children with severe damage in this area are constrained to move in patterns .If you ask them to move their whole leg, they can. We felt that all of the childrens would be able to perform the cycling exercise program.

CP is a multifarious and complex disease and hence only stationary cycling is being used for measurement of the pediatric endurance.

1.2 NEED FOR THE STUDY

Cerebral palsy is a crippling neurological disorder in childrens affecting the muscles of lower extremity in case of spastic diplegic type.Leading cause of developmental disability in childrens ,occurring in 1 in 500 live births and affecting more than 5,00,000 individuals. Spasticity,is characterized by a velocity-dependent increased resistance to passive strectch.New evolving techniques grades on improvement in paediatric endurance.

.

Hence this study was conducted to find the effective intervention in improving paediatric endurance by using stationary bicycling in childrens with spastic diplegic cerebral palsy.

1.3AIM OF THE STUDY

The aim of the study is to find out the effectiveness of static bicycle on improving the pediatric endurance in spastic diplegic cerebral palsy.

1.4 OBJECTIVES OF THE STUDY

To determine the effectiveness of using stationary bicycling as an intervention in improving paediatric endurance needed for the childrens with diplegic spastic cerebral palsy.

1.5 HYPOTHESIS

Alternate hypothesis :

There is significant difference in improvement in paediatric endurance of treating spastic diplegic cerebral palsy childrens with stationary bicycling.

Null hypothesis :

There is no significant difference in improvement in paediatric endurance of treating spastic diplegic cerebral palsy childrens with stationary bicycling.

1.6 OPERATIONAL DEFINITIONS

EDVIN ET AL

Cerebral palsy is a term used to describe a group of chronic conditions affecting body movements and muscle coordination. It is caused by damage to one or more specific areas of the brain, usually occurring during fetal development or infancy. It also can occur before, during or shortly following birth.

KARLSON

"Cerebral" refers to the brain and "Palsy" to a disorder of movement or posture. If someone has cerebral palsy it means that because of an injury to their brain (cerebral) they are not able to use some of the muscles in their body in the normal way (palsy). Children with cerebral palsy may not be able to walk, talk, eat or play in the same ways as most other children.

MADABICMLADEN

Cerebral palsy is neither progressive nor communicable. It is also not "curable" in the accepted sense, although education, therapy and applied technology can help persons with cerebral palsy lead productive lives. It is important to know that cerebral palsy is not a disease or illness. It isn't contagious and it doesn't get worse. Children who have cerebral palsy will have it all their lives.

GRABINER ET AL

Spastic diplegia, historically known as **Little's Disease**, is a form of cerebral palsy (CP) that is a neuromuscular condition of hypertonia and spasticity in the muscles of the lower extremities of the human body, usually those of the legs, hips and pelvis. Doctor William John Little's first recorded encounter with cerebral palsy is reported to have been among children who displayed signs of spastic diplegia.

ANAT WILEY

Cycling is avery useful biomechanical input,with less musculoskeletal complaints and is best tolerated by the patients without pain.

BENTLEY

Static cycling is a non-aggravating factor in reducing pain and is given with light load and seat raised is very effective in trarting cerebral palsy childrens.

CHAPTER II

REVIEW OF LITERATURE

1.LOS ANGELES : 1995

Studied the effects of stationary cycling on muscle strength ,locomotor endurance preferred walking speed and gross motor function . She and colleques reported significant improvements in endurance,GMFM scores and some measures of strength in cycling group.She also noted that the common feature the child has is periventricular white matter damage which affects the tracts for voluntary motor activity.This enhances further evaluation in her study in producing limb strengthening.

2. FOWLER : 1995

One reason we chose cycling is that childrens with severe damage in this area are constrained to move in patterns.If you ask them to move only their ankle,they can't; but if you ask them to move their whole leg ,they can.We felt that all of the childrens would be able to perform the cycling exercise program.

3.EILEEN FOWLER PT :1996

Has actively pursued the new research of using stationary bicycling in improving the paediatric endurance and he helps in clarifying the issues regarding his study.Cycling is performed in pain-free range and hence childrens of age group 7-18 yrs are included in this study and can be able to perform the cycling program.He and his colleques made more research in related areas.

4.DUTUCH AND HIS COLLEQUES : 1996

Concluded cautiously that childrens

With cerebral palsy may benefit from improved exercise programs that focuses on lower – extremity muscle strength ,locomotor endurance evolving the cardio-vascular fitness or combination of the program with other parameters.Also included 15 subjects in his study and had significant improvement in the experimental group.

5.DIANE DAMINO :1997

Explained that the treating person should need to know what muscles to strengthen,because strengthening the wrong muscles can lead to increased tightness and worse the functional activities of the childrens.Hence sationary bicycling not only increases the paediatric endurance but the flexibility of knee extensors and flexor are also noted.

6.LORETTA M KNUTSON : 1998

Cycling is a rehabilitation tool used by physical therapists to improve strength and cardio respiratory fitness and has been promoted as an appropriate exercise to improve fitness program for persons with cerebral palsy.Cycling provides progressive resistance exercise for lower extremity musculature.Muscles recruitment was studied by him using EMG studies.

7.SARON K DEMUTH :1998

Studied randomized controlled trial examining the effects of a stationary bicycling intervention for children with cerebral palsy.Sixty childrens with spastic diplegic cerebral palsy between age of 7-18 yrs and gross motor classification system levels are recruited for this study.He included both endurance and limb strengthening in 2 phases.

8.RICHARD B SOYZA :1999

He examine the effects of a stationary cycling intervention on muscle strength ,locomotor endurance in children with spastic diplegic cerebral palsy.He limited the patient population and the intrasubject variability among his groups .662 ambulatory childrens was included in this study.Emphazised on strength and endurance.

9.R YAN MM,GREGOR RJ : 2000

Describes EMG studies profiles of lower extremity muscles during cycling at constant work load and cadence.He emphasized mainly on limb strengthening and also improves cardio-vascular fitness.Knee joint flexor and extensor moment referred to as joint torque in clinical setting and shows it includes cycling is aan effective intervention for cerebral palsy childrens.

10.SCHOITES VA :2000

His paper describes the design and training protocol of a randomized controlled to assess the effects of a school based progressive functional strength and endurance in patients with cerebral palsy and intervention used by him is stationary bicycling .Significant improvements in locomotor endurance ,gross motor function and measures of strength in cycling group.

11.VODAK PA : 2000

Describes the validity of the 600 –yard walk run test in estimating capacity in boys of 9-12 yrs of age.Hence this scale is a reliable and valid scale in measuring the paediatric endurance in patients with spastic diplegic cerebral palsy.also this scale combined with other measures .In this study 32 ambulatory childrens were included and results evaluated with statistical tools.

12.ATKINSON S,STANLEY FJ : 2001

States the spastic diplegia affects about 60 % patients whish co exsists with dyskinesia and ataxia in mixed subtypes of cerebral palsy.The prevalence of spastic diplegia increases with decreasing gestational age and low birth weight.This relationship does not exist in other types of disease ,such as athetoid and dyskinetic cerebral palsy.cerebral palsy can be caused by various reasons but study included only soastic diplegic type of CP.

13.STANLEY P.AZEN : 2001

600 yard walk run test is a valid outcome measure in measuring paediatric endurance in patients with spastic diplegic cerebral palsy.This scale is converted to m/min and the locomotor endurance of the individuals is measured.This condition is almost occurs in 70 % of all cases where in endurance is measured.

14.DAVID D.LIMBRICK : 2002

Randomized 46 subjects with cycling group and non-cycling group.Paediatric endurance plays the major role in cardio vascular fitness and limb strengthening in patients with spastic

diplegic cerebral palsy.Significant base –line post intervention improvements were found for the 600-yard walk test in cycling group.

15.RIMMER JH : 2003

Describes that ambulatory childrens of age group 7 to 18 yrs with spastic diplegic cerebral palsy needs to ambulates independently by using static bicycling.He significantly improves the paediatric endurance and limb strengthening.the child should have good sensation and limb alignment.

16.DARRAH J,WESSER : 2004

Spastic diplegia is a common type of cerebral palsy affecting about 60 % of the childrens.In this study of cerebral palsy both lower limbs are being affected.Exhibits various intervention in decreasing the spasticity and improves the gait parameters in childrens .Hence staticbicycling is a valid intervention in treating the cerebral pasy childrens.

17.R KARIM AZEN : 2005

Children's with cerebral palsy have decreased capacity to participate in play and sport activities at intensities sufficient to develop and maintain adequate levels of muscular strength and cardio-respiratory fitness.The continuous usage of stionary cycling improves the endurance in patients with spastic diplegic cerebral palsy.

18.CARY GRONER : 2005

Describes that strength training can help address weakness in children with cerebral aplsy,but can't restore lost motor signals.But using a stationary cycling along with traditional treatment of stretching prior to cycling has significant improvement in paediatric endurance in cerebral palsy patients.

19.MC DOWELL ,ET AL :2006

Cerebral palsy is a prenatal insult to the cntral nervous system that affects the signal to specific muscles motor groups.strength training alone does not improves gait as stationary cycling also improves strength and loco motoe endurance.It is an optimal approach that would entail maintaining good locomotor endurance.

20.DALL MEIJER AJ : 2007

Cerebral palsy with spastic diplegia have relationship between plasticity,strength ,gait and endurance.His study emphasizied on improving paediatric endurance and limb strengthening with stationary bicycling in subjects around 40 with no use any other orthotic devices or supportive aids.

21.G.T MCCARTHY :2008

Describles cerebral palsy is a spectrum of motor disability which is non-progressive and caused by brain damage.He also found the paediatric endurance as a major outcome measure to be measured by using different scales in school going childrens.Endurance measured first by measuring the target heart rate.

22.PANETH ET AL :2008

Studied the reliability of using 30 sec walk test in cerebral palsy childrens.he included 30 subjects in his study and measured the time to reach target heart rate.He described the position of the children in semi recumbent position in about 15-20 degrees of flexion.and extended maximally to the the ability of the childrens .It is a valid scale in measuring the paediatric endurance.

23.YIOUNG JC : 2008

His purpose of the study were to expand the age ranges for his previously normative data base on the 30-sec walk test.Describes the changes with age ,explore the contributions of subject characteristics and verified the previous data.Resulted that percentage difference in using the 30 sec walk test was measured in childrens with spastic diplegic cerebral palsy.

24.PATRICA :2009

Cerebral palsy is a cripplimg neurological disease and different intervention used in treating different types of CP is needed.Spastic diplegia affects more of lower limb involvement and stretching is a major traditional activity given.Using new intervention like static bicycle improves the paediatric endurance.

25.ANDREW RUFF : 2010

Thirty second walk test was used in measuring for students in elementary school for cerebral palsy .He included 46 childrens divided according to their age and endurance was measured prior to examination and post test results were also measured and concluded the scale as a more effective and valid in measuring endurance especially for cerebral palsy childrens.

CHAPTER III

MATERIALS AND METHODOLOGY

3.1 MATERIALS REQUIRED

- Static bicycle
- Exercise couch
- Pilllow
- Meter scale
- Sensor to measure the heart rate

3.2 METHODOLOGY

3.2.1 STUDY DESIGN

- The study was an experimental study design with pretest and post test evaluation both in experimental and control group.

3.2.2 SAMPLING DESIGN

The subjects are selected by non-probability purposive sampling technique.

3.2.3 population

The sample size consist of 40 subjects with spastic diplegic cerebral palsy childrens were selected and assigned in to Group A experimental group and Group B control group.

Experimental group: Consist of 20 spastic diplegic cerebral palsy childrens treated with static bicycle

Control group : Consist of 20 spastic diplegic cerebral palsy childrens treated with traditional stretching and functional mat activities.

.3.2.4 SAMPLE

40 Subjects were included in the study.

3.2.5 SELECTION CRITERIA

Inclusion Criteria

- Age group between 7 to 18 yrs
- Ability to follow simple verbal directions
- Ability to walk independently with or with uot assistive devices.
- Good voluntary motor control for atleast one limb
- Both sexes of childrens
- Spastic diplegic cerebral palsy

Exclusion criteria

- Orthopedic surgery,neurological surgery or baclofen pump implantation with in preceeding 12 months.
- Serial casting or new orthotic devices preceeding 3 months
- Inability or unwillingness to maintain age related behaviour
- Sezures or cardiac disease
- Significant hip or knee contractures.

3.2.6 STUDY SETTING

This is proposed to be carried out in the Ashwin Hospital Community Centre, Ppg College Outpatient Department, Families For Children Podanur,.coimbatore

3.2.7 STUDY METHOD

Subjects were divided in to control group and experimental group.

CONTROL GROUP

20 Subjects were treated with traditional stretching and mat activities

EXPERIMENTAL GROUP

20 subjects were treated with static bicycle

3.2.8 STUDY DURATION

The study is proposed to be carried out for the period of 6 months.

3.2.9 TREATMENT DURATION

The study was done for 12 weeks &individual subject received 3 dyas per week and all together received 30 sessions

3.2.10 PARAMETER

1. 600-Yard walk run-test

30 sec walk test

3.2.11 STATISTICAL TOOLS

Paired‘t’ – test

The intra group analysis of results were done with paired ‘t’ test with 5% level of significance. Statistical analysis is done by using dependent ‘t’ test

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

d = difference between the pre-test Vs post test

$\bar{d}$ = mean difference

n= number of observations

s = standard deviation

To compare control Group and Experimental Group

Statistical analysis is done by using independent 't' test

$$t = \frac{\overline{X_1} - \overline{X_2}}{S}\sqrt{\frac{n_1 n_2}{(n_2 + n_2)}}$$

$$S = \sqrt{\frac{\sum d_1^{\,2} + \sum d_2^{\,2}}{n_1 + n_2 - 2}}$$

Where

S = Combined standard deviation

d_1 and d_2 = Difference between initial and final readings in control group and experimental group respectively.

n_1 = No. of patients in control group

n_2 = No. of patients in experimental group

$\overline{X_1}$ *and* $\overline{X_2}$ = Mean of control Group and experimental Group respectively.

3.2.12TREATMENT TECHNIQUES

General instructions about the procedure was explained to the patient .

Warm up exercise were given for a duration of 5 minutes.

Patient is being treated with static bicycle for about 28 revolutions per minute.The 600 yard walk run test was converted to m/minute and then measured by 30 sec walk test.

3.2.13 PROCEDURE

Written consent was being obtained from the patient .Before starting the treatment the complete procedure was explained to the patient .Each patient will undergo formal evaluation of inclusion in to the study.Subjects were advised not to under go any other exercise or treatment during the study period.At the beginning of the study the patients endurance was measured by 600-yard walk run test.

*The samples were collected randomly ,30 patients were randomly assigned in to 2 groups,the study population included only those met the inclusive criteria.40 subjects were divided in to 2 groups.

Group A :Experimental group : stationary bicycling group.

Group B : Control group : Control group :Traditional strectching and functional mat activities.

Both groups were undergone pre test were the patient under experimental group (Group A) are treated for 30 minutes in alternate days for 3 days per week totally 30 sessions & was supervised by the physiotherapist.The patient will undergo initial 5 min of general warm-up exercises .

*Subjects advised not to undergo any other exercise or treatment during the study period and supervised by therapist.

*Data were collected on first day and last day of treatment and assessed at regular intervals.

CHAPTER IV

TABLE 1

EXPERIMENTAL GROUP
(GROUP-A)

S.NO	600-YARD WALK RUN TEST		30 SEC WALK TEST	
1	72	85	120	135
2	70	79	123	132
3	69	78	124	135
4	68	78	125	140
5	70	82	130	142
6	65	77	115	125
7	66	80	121	134
8	70	84	122	135
9	71	82	119	132
10	64	79	120	130
11	63	77	123	132
12	62	76	114	125
13	69	83	127	140
14	68	80	126	142
15	67	81	125	137
16	73	84	121	135
17	62	78	123	130
18	64	81	119	132
19	66	75	115	130
20	65	82	114	127

TABLE 2

CONTROL GROUP (GROUP-B)

S.NO	600-YARD WALK RUN TEST		30 SEC WALK TEST	
1	62	65	123	128
2	64	67	124	129
3	62	62	119	124
4	67	69	115	118
5	71	70	114	119
6	65	69	134	135
7	70	74	124	126
8	63	65	114	115
9	67	70	119	122
10	72	73	120	121
11	71	73	124	126
12	63	65	125	128
13	67	67	128	129
14	69	69	118	121
15	72	77	117	119
16	68	73	114	116
17	64	68	112	115
18	62	65	115	117
19	66	68	122	124
20	65	68	121	125

CHAPTER V

TABLE-3

POST TEST VALUES OF 600 YARD WALK RUN TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

S. NO	GROUP	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	"T" VALUE
1.	EXPERIMENTAL GROUP (A)	80.05	11.2	3.306	15.150
2.	CONTROL GROUP(B)	68.85			

For 38 degrees of freedom at 5% level of significance, calculated post test values

Between control and experimental group in 600 yard walk run test was 15.150 and critical values was 2.021 which states that there is significant difference between groups

TABLE-4

PRE AND POST TEST VALUES OF 600 YARD WALK RUN TEST IN EXPERIMENTAL GROUP

S. NO	GROUP	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	"T" VALUE
1.	PRE TEST	68.25	0.60	0.3326	32.942
2.	POST TEST	68.85			

For 19 degrees of freedom at 5 % level of significance the calculated pretest and post test values experimental group in 600 yard walk run test was 32.942 and critical values was 2.093 which states that there exists a significant difference between the groups.

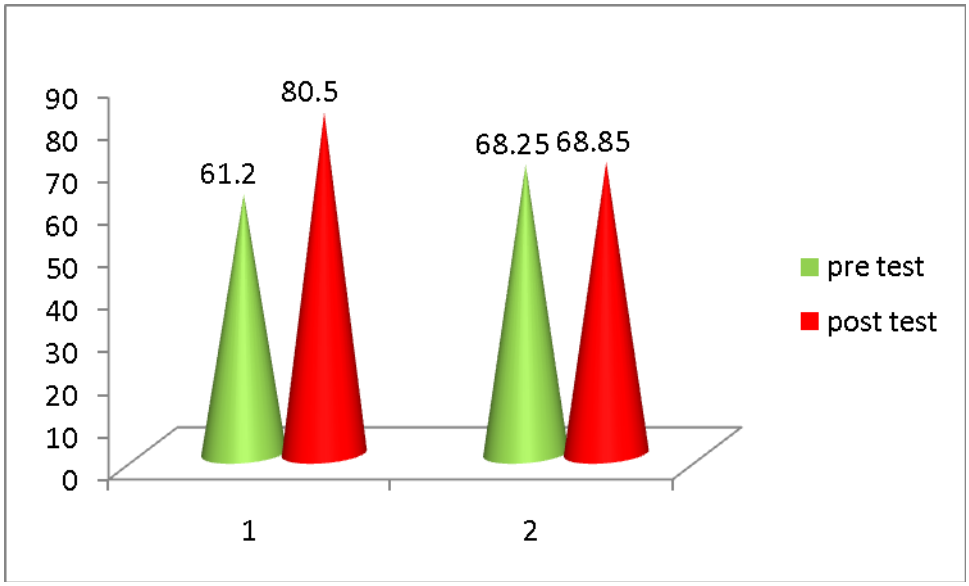
TABLE-5

PRE AND POST TEST VALUES OF 600 YARD WALK RUN TEST IN CONTROL GROUP

S. NO	GROUP	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	"T" VALUE
1.	PRE TEST	67.2	12.85	0.5737	100.16
2.	POST TEST	80.05			

For 19 degrees of freedom at 5% level of significance the calculated pretest and post test values of control group in 600 yard walk run test was 100.16 and critical values was 2.093 which states that there exists a significant difference between the groups

600 YARD WALK RUN TEST



1.EXPERIMENTAL GROUP
2.CONTROLL GROUP

TABLE-6

POST TEST VALUES OF 30 SEC WALK TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

S. NO	GROUP	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	"T" VALUE
1.	EXPERIMENTAL GROUP (A)	133.5	10.65	5.260	6.4027
2.	CONTROL GROUP(B)	122.85			

For 38 degrees of freedom at 5% level of significance, calculated post test values between control and experimental group in 30 sec walk test was 6.4027 and critical values was 2.021 which states that there is significant difference between groups.

TABLE-7

PRE AND POST TEST VALUES OF 30 SEC WALK TEST IN EXPERIMENTAL GROUP

S. NO	GROUP	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	"T" VALUE
1.	PRE TEST	121.3	12.2	0.539	71.576
2.	POST TEST	133.5			

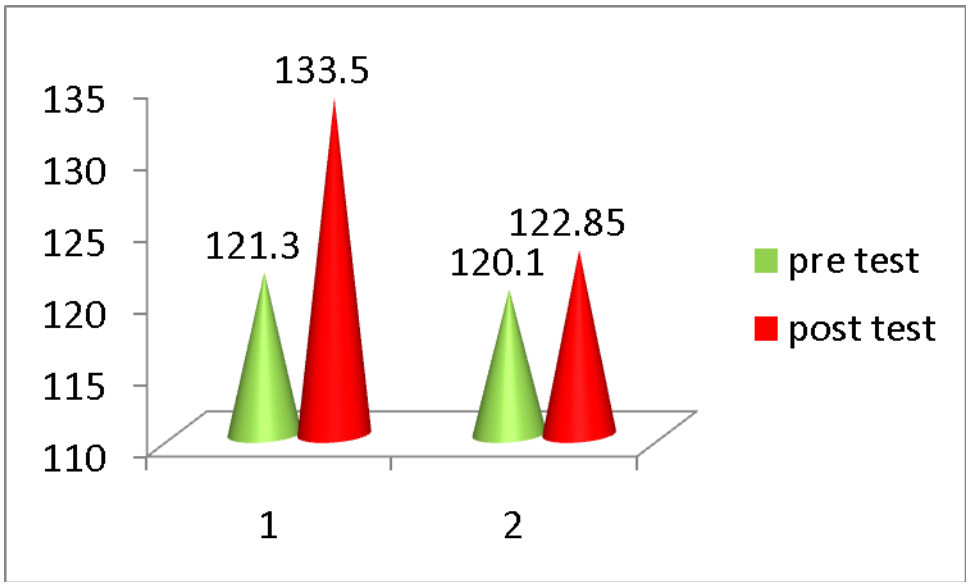
For 19 degrees of freedom at 5 % level of significance the calculated pretest and post test values experimental group in 30 sec walk test was 71.576 and critical values was 2.093 which states that there exists a significant difference between the groups.

TABLE-8
PRE AND POST TEST VALUES OF 30 SEC WALK TEST IN CONTROL GROUP

S. NO	GROUP	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	"T" VALUE
1.	PRE TEST	120.1	2.75	0.3166	26.96
2.	POST TEST	122.85			

For 19 degrees of freedom at 5% level of significance the calculated pretest and post test values of control group in 30 sec walk test was 26.96 and critical values was 2.093 which states that there exists significant difference between the groups.

30 SEC WALK TEST



1.EXPERIMENTAL GROUP
2.CONTROL GROUP

CHAPTER VI

RESULTS

Effectiveness of control group was measured by comparing pretest and post test values in 600 yard walk run test and 30 sec walk test.Calculated ‘t’ values is greater than the critical values indicates that there is a significant difference in between the groups.

Effectiveness of experimental group was measured by comparing pretest and post values in 600 yard walk run test and 30 sec walk test.Calculated ‘t’ values greater than the critical values indicates that there exists a significant difference in between the groups.

By comparing the ‘t’values of the experimental and control group, the ‘t’ values of the experimental group is greater than the ‘t’ values of the control group .

Spastic diplegia,historically known as little’s disease is a neuromuscular condition of hypertonia and spasticity in the muscle of lower extremities of childrens .Prevalence increase with the gestational age and low birth weight and the major problem encountered is weakness and lack of physical activity.

Eventhough physical exercise promote the physical activity and strengthening some current research indicates that resistive exercise does not infact improve the strength and function for children with cerebral palsy.

The 600 yard walk-run test assesses walking and/or running endurance at the activity level of the ICF. This test is an indirect measure of cardiorespiratory fitness and is reflective of a child's ability to participate in play and sport activities. It is a standardized physical fitness test developed for school-age children. Distances of less than 600 yards will be measured using a distance-measuring wheel. Outcomes include the distance the child is able to complete, the time for completion and the speed.

The 30 sec WT assesses walking function at the activity level of the ICF and is reflective of a child's ability to walk within the school environment. This test will be administered in a gymnasium by asking the subject to walk at a comfortable speed and to stop when 30 seconds have elapsed. Children will be instructed to walk as if they were the leader in a line at school.

This study focusses on improvement in paediatric endurance by using new technique of stationary bicycling which was measured by using 600 yard walk run test and 30 sec walk test.statistical significance of 5% level of significance in this states that there is significant improvement in paediatric endurance of the spastic diplegic cerebral palsy childrens.

Thus this study accepts the alternate hypothesis and rejects the null hypothesis since ‘t’ value is greater than the tabulated value and shows that there is a significant difference between two groups**.**

CHAPTER VII

DISCUSSION

Cerebral palsy is a static neurological disorder characterized by abnormalities of movement and posture.spastic diplegia affect approximately 60 % of patients.Co-exists with dyskinesia and ataxia in mixed subtype of CP.Spasticity affects in 80 % of all patients with cerebral palsy.in this study,an effective intervention in treating spastic diplegic cerebral palsy with static bicycling improves the paediatric endurance in that population.the results of this study could yield greater understanding of new techniques performed as a part of understanding of new techniques performed as apart of new techniques performed as a part of CP rehabilitation program by to them which improves the limb strengthening too.

*Group A (20 subjects) who fulfill the inclusive criteria received static bicycling for 30 minutes were given.

*Group B (20 subjects)who fulfill yhe inclusive criteria received traditional stretching and functional mat activities for 30 minutes were given.

The results showed there is significant improvement in group A when compared to group B is noted.

The improvement is due to the fact that cycling as a rehabilitation tool used by physical therapists to improve strength and cardio-respiratory fitness.Also,provide progressive resistance exercise for lower extremity musculature .Also ,there is significant muscle recruitment in EMG studies.During cycling it enhances stability to lower extremity joint being treated.In childrens with gait impairment cycling improves the torque of knee flexors &extensors and improves the torque of knee flexors & extensors and improves the gait parameters.

MC DOWELL ,ET AL

Cerebral palsy is a prenatal insult to the cntral nervous system that affects the signal to specific muscles motor groups.strength training alone does not improves gait as stationary cycling also improves strength and loco motoe endurance.It is an optimal approach that would entail maintaining good locomotor endurance.

LORETTA M KNUTSON

Cycling is a rehabilitation tool used by physical therapists to improve strength and cardio respiratory fitness and has been promoted as an appropriate exercise to improve fitness program for persons with cerebral palsy.Cycling provides progressive resistance exercise for lower extremity musculature.Muscles recruitment was studied by him using EMG studies.

Cycling prevents debilitating conditions resulting from immobility such as skin break down,contractures and improves respiration,swallowing and development of head and trunk control.

This promotes activation and control of lower extremity muscle in a reciprocal pattern and progression in patients similar to walking.Long term benefits include strengthening of anti-gravity muscles.bones to muscle growth,improved eye hand co-ordination,opportunity of cognitive growth and improved self esteem and social acceptance.Lower extremity cycling is a rehabilitation tool used by physical therapist to improve strength and cardio-respiratory fitness and well suited as a therapeutic intervention for children with cerebral palsy.

The calculated pretest and post test values experimental group in 600 yard walk run test was 100.16 and critical values was 2.093 . The calculated pretest and post test values of control group in 600 yard walk run test was 32.992 and critical values was 2.093 which states that there exists a significant difference between the groups. the calculated pretest and post test values experimental group in 30 sec walk test was 71.576 and critical values was 2.093 . The calculated pretest and post test values of control group in 30 sec walk test was 26.96 and critical values was 2.093 which states that there exists significant difference between the groups.

Thus,stationary cycling program adds to growing evidence of management of spastic diplegic cerebral palsy childrens to improve paediatric endurance which is proved by outcome measures confirmed by many randomized control trials.

CHAPTER VIII

CONCLUSION

The pre test and post test scores are noted and analysis was done using independent ‘t’ test which favored the alternate hypothesis.

The intra group analysis was done and results were analysed using paid ‘t’ test, which favored the alternative hypothesis.

The study concludes that stationary bicycling in beneficial in improving paediatric endurance in patients with spastic diplegic cerebral palsy.Thus,this study accepts the alternate hypothesis.

CHAPTER IX

LIMITATIONS & SUGGESTIONS

- The period of time allotted for the study was found to be insufficient for the inclusion of greater no: of subjects.
- Influence of drug,nutritional ,psychological state and climate cannot be controlled
- Study focuses on patients in measuring endurance alone.
- Patients were not instructed for home exercises program
- Though 600 yard walk run test and 30 sec walk test were administered ,bias is possible.
- The time allotted for the study per day can be increased to get better prognosis
- Follow up program can be included to know the long term effect of trearment
- Study with more number of patients is recommended.
- Study to measure the limb strengthening can be included**.**

CHAPTER X

BIBILIOGRAPHY

Wiley ME, Damiano DL. Lower-extremity strength profiles in spastic cerebral palsy. *Dev Med Child Neurol.*1998;40:100-107. PubMed Link

Rose J, McGill KC. Neuromuscular activation and motor-unit firing characteristics in cerebral palsy. Dev Med Child Neurol. 2005; 47:329-336. PubMed Link

Fowler EG, Ho TW, Nwigwe Al, Dorey FJ: The effect of quadriceps femoris muscle strengthening exercises on spasticity in children with cerebral palsy. *Phys Ther* 2001; 81:1215-1223. PubMed Link

Damiano DL, Vaughan CL, Abel MF. Muscle response to heavy resistance exercise in children with spastic cerebral palsy. *Dev Med Child Neurol.*1995;37:731-739. PubMed Link

Dodd KJ, Taylor NF, Damiano DL. A systematic review of the effectiveness of strength-training programs for people with cerebral palsy. *Arch Phys Med Rehabil.* 2002;83:1157-1164. PubMed Link

Damiano DL, Kelly LE, Vaughn CL. Effects of quadriceps femoris muscle strengthening on crouch gait in children with spastic diplegia. Phys Ther. 1995;75:658-67. PubMed Link

Fowler E, Kolobe T, Damiano D, Thorpe D, Morgan D, Brunstrom J, Coster W, Henderson R, Pitetti K, Rimmer J, Rose J, Stevenson R. Promotion of Physical Fitness and Prevention of Secondary Conditions for Children with Cerebral Palsy: Section on Pediatrics Research Summit Proceedings. *Physical Therapy* 2007 Nov;87(11):1495-510. PubMed Link

Mactavish J B, Schleien S J. Re-injecting spontaneity and balance in family life: parents' perspectives on recreation in families that include children with developmental disability. *Journal of Intellectual Disability Research* 2004 Feb;48(Pt 2):123-41. PubMed Link

Williams H, Pountney T. Effects of a static bicycling programme on the functional ability of young people with cerebral palsy who are non-ambulant. *Dev Med Child Neurol* 2007 Jul;49(7):522-7. PubMed Link

King EM, Gooch JL, Howell GH, Peters ML, Bloswick DS, Brown DR. Evaluation of the hip-extensor tricycle in improving gait in children with cerebral palsy. *Dev Med Child Neurol* 1993 Dec; 35(12):1048-54. PubMed Link

Ryan MM, Gregor RJ. EMG profiles of lower extremity muscles during cycling at constant workload and cadence. *J Electromyography Kinesiol.* 1992;2:69-80. Publisher Full Text

Kaplan SL. Cycling patterns in children with cerebral palsy. *Dev Med Child Neurol.* 1995;37:620-630. PubMed Link

Fowler E, Knutson L, DeMuth S, Sugi M, Siebert K, Simms V, Azen S, Winstein C. Pediatric endurance and limb strengthening for children with cerebral palsy (PEDALS) – a randomized controlled trial protocol for a stationary cycling intervention. *BMC Pediatrics* 2007, 7:14. Complete Text

CHAPTER XI

REFERENCES

1. O: **Maximal treadmill performance in children with cerebral palsy.**
2. *Pediatric Exercise Science* 1995, **7:**305-313.
3. Return to text
4. Morgan D, Keefer DJ, Tseh W, Caputo JL, Craig I, Griffith G, Vint P: **Walking energy use in children with spastic hemiplegia.**
5. *Pediatric Exercise Science* 2005, **17:**91-92.
6. Return to text
7. Rose J, Gamble JG, Medeiros J, Burgos A, Haskell WL: **Energy cost of walking in normal children and in those with cerebral palsy: comparison of heart rate and oxygen uptake.**
8. *J Pediatr Orthop* 1989, **9:**276-279. PubMed Abstract
9. Return to text
10. Unnithan VB, Dowling JJ, Frost G, Bar-Or O: **Role of cocontraction in the O2 cost of walking in children with cerebral palsy.**
11. *Med Sci Sports Exerc* 1996, **28:**1498-1504. PubMed Abstract | Publisher Full Text
12. Return to text
13. Bobath K: *A Neurophysiological Basis for the Treatment of Cerebral Palsy.* 2nd edition. London, William Heineman Books Ltd.; 1980.
14. Return to text
15. Dodd KJ, Taylor NF, Graham HK: **A randomized clinical trial of strength training in young people with cerebral palsy.**
16. *Dev Med Child Neurol* 2003, **45:**652-657. PubMed Abstract | Publisher Full Text
17. Return to text
18. Fowler EG, Ho TW, Nwigwe AI, Dorey FJ: **The effect of quadriceps femoris muscle strengthening exercises on spasticity in children with cerebral palsy.**
19. *Phys Ther* 2001, **81:**1215-1223. PubMed Abstract | Publisher Full Text
20. Return to text

21. MacPhail HE, Kramer JF: **Effect of isokinetic strength-training on functional ability and walking efficiency in adolescents with cerebral palsy.**
22. *Dev Med Child Neurol* 1995, **37:**763-775. PubMed Abstract
23. Return to text
24. Damiano DL, Vaughan CL, Abel MF: **Muscle response to heavy resistance exercise in children with spastic cerebral palsy.**
25. *Dev Med Child Neurol* 1995, **37:**731-739. PubMed Abstract
26. Return to text
27. Damiano DL, Kelly LE, Vaughn CL: **Effects of quadriceps femoris muscle strengthening on crouch gait in children with spastic diplegia.**
28. *Phys Ther* 1995, **75:**658-67; discussion 668-71. PubMed Abstract | Publisher Full Text
29. Return to text
30. Darrah J, Wessel J, Nearingburg P, O'Connor M: **Evaluation of a community fitness program for adolescents with cerebral palsy.**

CHAPTER XII

APPENDIX -1

PATIENT CONSENT FORM

TITLE : **EFFECTIVENESS OF STATIC BICYCLE ON IMPROVING PAEDIATRIC ENDURANCE IN SPASTIC DIPLEGIC CEREBRAL PALSYCHILDREN**

Investigator : ----------

PURPOSE OF THE STUDY :

I ----------,have been informed that this study will work towards achieving on functional activities of daily living in cerebral palsy conditions for me and other patients.

PROCEDURE :

Each term of the study protocol has been explained to me in detail.I understand that during the procedure ,I will be receiving the treatment for one time a day .I understand that I will have to take this treatment for 16 weeks.

I understand that this will done under investigator ,---------- supervision .I am aware also that I have to follow therapist's instructions ashas told to me.

CONFEDENTIALITY :

I understand that medical information provided by this study will be confidential.If the data are used for publication in the medical literature or for teaching purposes,no names will be used and other literature such as audio or video tapes will be used only with permission.

RISK AND DISCOMFORT :

I understand that there areno potential risks associated with this procedure ,and understand that investigator will accompany me during this procedure..there is no known hazards associated with this procedure.

REFUSAL OR WITHDRAWAL OF PARTICIPATION :

I understand that the decision my participation is wholly voluntary and I may refuse participate ,may withdraw consent at any time during the study .

I also understand that the investigator may terminate my participation in the study at any time after researcher has explained me the reasons to do so.

I ----------have explained the purpose of the research ,the procedures required and the possible risks and benefits,to the best of my ability,I have read and understood this consent to participatwe as a subject in this research project.

Signature of the witness : DATE :

Signature of the parent :

APPENDIX-2

PATIENT PROFILE

NAME :
AGE :
SEX :
OCCUPATION :
DATE OF ASSESSMENT :
CHIEF COMPLAINTS :

SUBJECTIVE
a)History
Present medical history
Past medical history
b)Surgical history
c)Drug history
d) Personel history
e)Family history
ON OBSERVATION
a)Built
b)Swelling
c)Soft tissue contours

VITAL SIGNS
a)Temperature
b)Blood pressure
c)Heart rate
d)Respiratory rate

EXAMINATION ;

1. Higher functions
2. Mental status
3. Speech
4. Hearing Sensory system
5. Vision
6. Cranial nerves

7. Sensory system
8. sensation
9. Motor system
10. Reflexes
11. Co-ordination
12. Involuntary movements
13. Balance
14. Gait analysis
15. hand function
16. Assistive devices

17.Functional assessment

PROBLEM LIST

MEANS

APPENDIX 3

600 YARD WALK RUN TEST

The 600 yard walk-run test [39] assesses walking and/or running endurance at the activity level of the ICF. This test is an indirect measure of cardiorespiratory fitness and is reflective of a child's ability to participate in play and sport activities. It is a standardized physical fitness test developed for school-age children. Fernhall et al. [39] used this test for children with intellectual disabilities and found a high correlation with laboratory measures of peak $V0_2$. During this test, children are asked to complete a 600 yard distance as fast as possible by running, walking or a combination of both. The distance required will be clearly explained so they may pace themselves. Orange cones will be placed to visibly mark the perimeter of the circular path. Subjects will be encouraged verbally to continue walking or running until they complete the 600 yard distance. If a subject cannot complete this distance within 15 minutes or stops for more than five seconds, the test will be stopped. At the end of the test, the distance completed and the time will be recorded. Distances of less than 600 yards will be measured using a distance-measuring wheel. Outcomes include the distance the child is able to complete, the time for completion and the speed.

APPENDIX 4

30 SEC WALK TEST

The 30 sec WT assesses walking function at the activity level of the ICF and is reflective of a child's ability to walk within the school environment. Normative data for 227 children between the ages of six and 13 years are available for comparison [40]. This test will be administered in a gymnasium by asking the subject to walk at a comfortable speed and to stop when 30 seconds have elapsed. Children will be instructed to walk as if they were the leader in a line at school. The examiner will monitor time using a stopwatch. When 30 seconds have elapsed, the examiner will instruct the subject to "freeze" and not move until his or her foot position is marked. The distance from the starting line to the heel of the forward-most foot will be measured using a distance-measuring wheel. Outcomes will be the total distance walked and walking speed